

Experimental mapping of the photonic band structure in SOI photonic crystal waveguides

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We report on systematic experimental mapping of the transmission properties of W1 photonic crystal waveguides as a function of the hole radius, slab thickness and crystal length for both TE and TM polarizations.

Detailed analysis of numerous spectral features allows a direct comparison of their spectral positions with 3D plane wave calculations. We find, counter-intuitively, that the bandwidth for low loss propagation completely vanishes for structural parameters where the PBG is maximized (slab thickness $\sim 0.5a$ and hole radius $\sim 0.35a$). Our results demonstrate that, in order to increase the maximum bandwidth, the hole radius must be significantly reduced to $R/a \sim 0.2$ (Fig.1). While the PBG narrows considerably here, the bandwidth of low-loss propagation in W1 waveguides is increased up to 125nm.

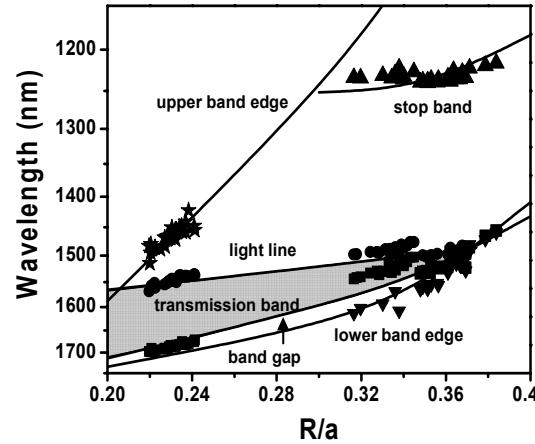


Fig.1: Experimental map for the TE-mode in SOI W1 PhC waveguides. Solid lines are 3D plane wave calculations.